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Final Report

Grant to Support the
17th Annual Conference on the
Physics and Chemistry of Semiconductor Interfaces

U.S. Navy Office of Naval Research
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Prepared by
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October 12, 1992

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Final Report

The seventeenth annual conference on the Physics and Chemistry of Semiconductor Interfaces (PCSI-17) was held at Clearwater Beach, FL on January 31-February 2, 1990. The organizing and program committee membership is shown in Appendix 1. In addition, the local arrangements committee is also shown in Appendix 1. The program and meeting was quite successful, with presentation of seventy three papers from the US and nine foreign countries, as shown in Appendix 2. The meeting was attended by 132 scientists as shown in Appendix 3. Finally the papers from the meeting were published in the Journal of Vacuum Science and Technology, Volume B4, July/August, 1990, as shown in Appendix 4.

In summary, the meeting was quite successful and served its intended purpose. The organizers are grateful for the support of the Office of Naval Research.

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Appendix 1

Organizing and Program Committee
Local Arrangements Committee

**SEVENTEENTH ANNUAL CONFERENCE
PHYSICS AND CHEMISTRY OF
SEMICONDUCTOR INTERFACES**

January 31 - February 2, 1990

Sheraton Sand Key Hotel

Clearwater, Florida

ORGANIZING AND PROGRAM COMMITTEE

J. E. Rowe (AT&T Bell Labs.) - Chair

F. Grunthaner (JPL)

I. Lindau (Stanford)

T. McGill (Cal Tech.)

A. Pinczuk (AT&T Bell Labs.)

J. Woodall (IBM-Yorktown Hgts.)

P. Cohen (Minnesota)

L. Brillson (Xerox-Webster)

A. Zunger (SERI)

EX OFFICIO

R. Bauer (Xerox PARC)

R. Grant (Rockwell)

L. Cooper (ONR)

H. Wittmann (AFOSR)

LOCAL ARRANGEMENTS

Paul Holloway - Chair

Department of Materials Sci. & Engrg.

T. Anderson (UF)

A. Fuente (GE)

K. Jones (UF)

R. Park (UF)

L. Provo (GE)

H. Starling (GE)

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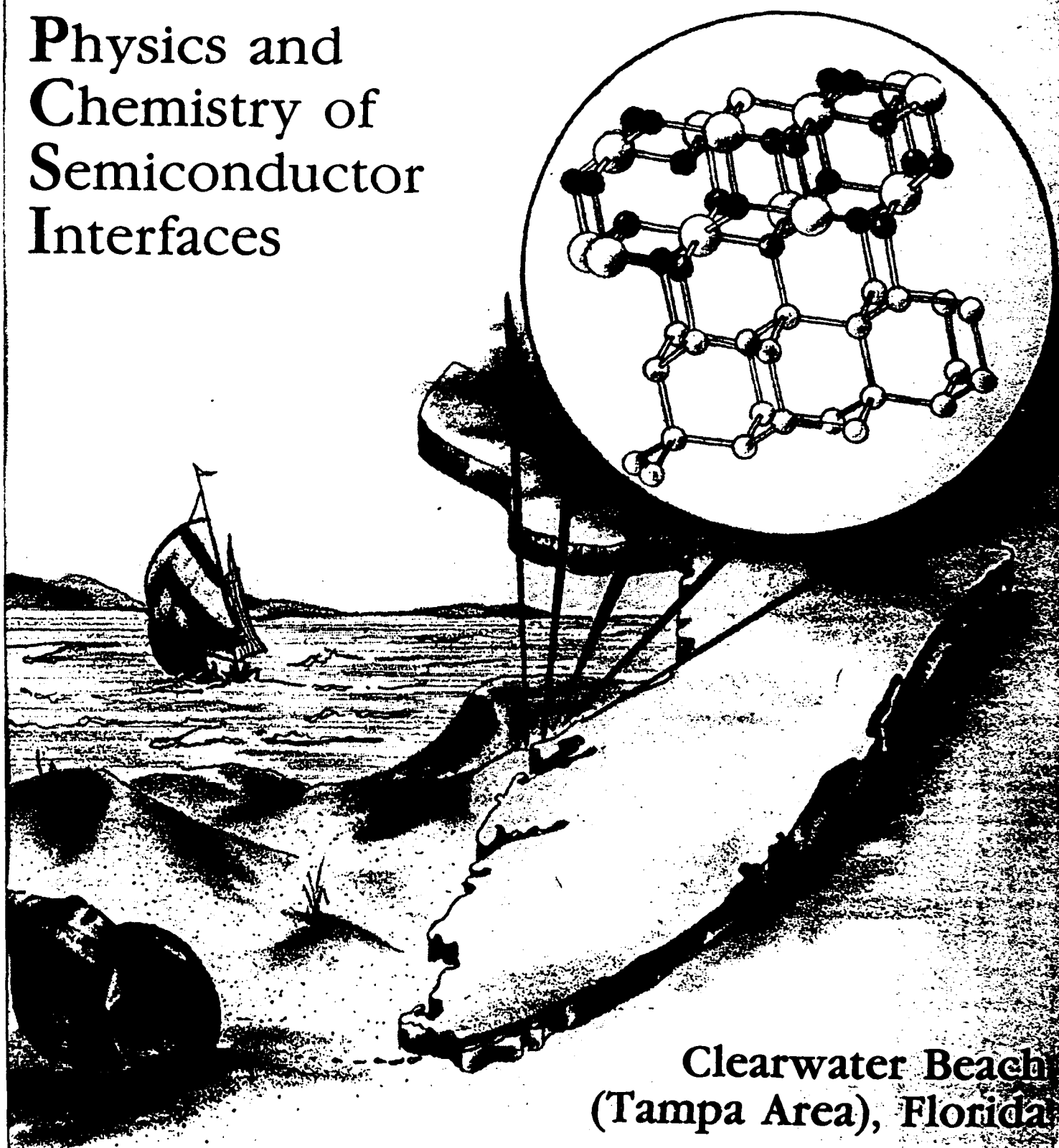
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Appendix 2

PCSI-17 Program

PCSI - 17

Physics and Chemistry of Semiconductor Interfaces



Clearwater Beach
(Tampa Area), Florida

January 31 - February 2, 1990

PCSI-17 PROGRAM

Sheraton Sand Key Hotel, Clearwater, Florida

Tuesday, January 30, 7:00 p.m. to 9:30 p.m Welcoming Reception

Wednesday, January 31, 1990

7:00 Breakfast buffet: Morning Session

8:20 WELCOMING REMARKS

SESSION I. Growth Ia: Hetero-Epitaxy Chair: T. C. McGill
Discussion Leader: G. J. Lapeyre

- 8:30 (1) (Invited) "Surface Morphology During Epitaxial Growth and Interface Formation," M. Lagally (Wisconsin)
- 9:00 (2) "In-Situ Diffraction Studies of Strained InGaAs Films Prepared by Molecular Beam Epitaxy," G. J. Whaley & P. I. Cohen, (University of Minnesota, Minneapolis, MN)
- 9:05 (3) "RHEED Intensity Oscillations During MBE Growth of GaAs/AlGaAs Interface Formation on (111)B GaAs Substrates," M. Y. Yen, D. H. Tomich, T. W. Haas* and W. V. Lampert*, (UDRI, Wright-Patterson*, OH)
- 9:10 (4) "Empirical Interatomic Potentials for Compound Semiconductors: Application to Superlattice Stability," K. E. Khor, Tomonori Ito and S. Das Sarma. (University of Maryland, College Pk, MD)
- 9:15 Discussions

SESSION I. (cont'd) Growth Ib: Strained Layers

- 9:25 (5) "The Growth of Bismuth and Antimony Overlayers on InP(110)," C. Stephens*, D. R. T. Zahn+, K. Fives*, R. Cimino#, W. Braun**, and I. T. McGovern* (*Trinity College, Dublin, Ireland, +Technische Universität, Germany, #Fritz-Haber-Institut, Germany, **BESSY, Germany)

- 9:30 (6) "Thermal Stability of Sb Overlayers on GaAs(110) and InP(110)," N. Esser, D. R. T. Zahn, C. Stephens*, M. Reckqügel and W. Richter (Institut Festkörperphysik. Germany, *Trinity College, Ireland)
- 9:35 (7) "Synchrotron Radiation Assisted Metalorganic Layer Epitaxy (SRMOLE)," H. Höchst and M. A. Engelhardt (University of Wisconsin, WI)
- 9:40 (8) "Distribution of Growth Rate on Patterned Surface Measured by Scanning Microprobe Reflection High-Energy Electron Diffraction," M. Hata, T. Isu, A. Watanabe and Y. Katayama (Optoelectronics Tech. Research Lab, Ibaraki, Japan)
- 9:45 Discussions
- 10:00 Break
- 10:15 (9) "Growth of Antiphase Domain Free GaAs on Epitaxial Ge by Molecular Beam Epitaxy," S. Strite, K. Adomi, and H. Morkoc (University of Illinois, Urbana, IL)
- 10:20 (10) "In-situ Low Energy Ion Scattering Analysis of InP Surfaces During Molecular Beam Epitaxy," M. Kubo and T. Narusawa (Semiconductor Research Center, Osaka, Japan)
- 10:25 (11) "Influence of GaAs Surface Stoichiometry on the Electrical Properties of As-Grown Epitaxial ZnSe/Epitaxial GaAs Heterointerfaces," J. Qiu, Q.-D Qian, R. L. Gunshor, M. Kobayashi, D. R. Menke, D. Li, and N. Otsuka (Purdue University, W. Lafayette, IN)
- 10:30 (12) "Disruption, Local Order and Epitaxy at the Sn/III-V Semiconductor Interfaces," M. Tang, J. J. Joyce, Y. Meng, J. Anderson, and G. J. Lapeyre (Montana State University, Bozeman, MT)
- 10:35 (13) "Growth and Characterization of InAs/Ga_{1-x}In_xSb Strained-layer Superlattices," D. H. Chow, R. H. Miles*, J. R. Söderström and T. C. McGill (CIT, Pasadena, CA, *HRL, Malibu, CA)
- 10:40 Discussions

- 10:45 (14) "Electronic and Geometric Structure of Epitaxially Grown CaF_2 and SrF_2 Passivation Layers on $\text{InP}(001)$," W. Weiß, D. Schmeißer and W. Göpel (Universität Tübingen, FRG)
- 10:50 (15) "Structure, Chemistry, and Fermi-level Movement at Interfaces of Epitaxial NiAl and $\text{GaAs}(001)$," S. A. Chambers and V. A. Loebs (BAEHT, Seattle, WA)
- 10:55 (16) "Homogeneous Nucleation of Dislocations in $\text{In}_4\text{Ga}_6\text{As}/\text{GaAs}$ Above the Critical Thickness," K. R. Breen, P. N. Uppal* and J. S. Ahearn*, (Dept. of Mat. Science, John Hopkins University, Baltimore, MD, *Martin Marietta Labs, Baltimore, MD)
- 11:00 Discussions
- 11:15 Poster Viewing
- 12:05 LUNCH

Wednesday Afternoon Session

**SESSION III. Strained-layer Structures and Band Offsets -
Chair: Rudy Ludeke**

- 1:15 (17) (Invited) "In-situ Electron Microscope Observations of Relaxation Modes in GeSi/Si Strained Layers," R. Hull, J. C. Bean, S. D. Berger, and J. M. Bonar (AT&T Bell Laboratories, Murray Hill, NJ)
- 1:40 (18) "Relative Core Level Deformation Potentials in Strained Layer Heterojunctions," R. W. Grant, J. R. Waldrop, E. A. Kraut, and W. A. Harrison* (Rockwell Int. Sci. Ctr., Thousand Oaks, CA, *Stanford University, Stanford, CA)
- 1:45 (19) "Growth Kinetics in Heteroepitaxy and Growth of Monolayer Superlattices by Atomic Layer Epitaxy: GaAs/GaP SLS," M. Ozeki, K. Kodama, Y. Sakuma and N. Ohtsuka (Fujitsu Lab. Ltd., Atsugi, Japan)
- 1:50 (20) "Band Offset Measurements of ZnTe/AlSb Heterojunctions," G. P. Schwartz, G. J. Gualtieri, R. D. Feldman, and R. G. Nuzzo (AT&T Bell Laboratories, Murray Hill, NJ)

1:55 (21) "Dependence of Structural and Optical Properties of $\text{In}_{0.23}\text{Ga}_{0.77}\text{As}/\text{GaAs}$ Quantum Wells on Misfit Dislocations: Different Critical Thickness for Dislocation Generation and Degradation of Optical Properties," M. Grundmann, U. Lienert, J. Christen, D. Bimberg, A. Fischer-Colbrie*, and J. N. Miller* (Institut für Festkörperphysik I, F. R. Germany, *Hewlett Packard Labs, Palo Alto, CA)

2:00 Discussions

2:10 (22) "The Effect of Strain on the Valence Band Structure of $\text{InAs}(100)$," M. D. Williams and T.-H. Chiu (AT&T Bell Laboratories, Holmdel, NJ)

2:15 (23) "Test of Band Offset Commutativity by Photoemission from an *in situ* Grown $\text{ZnTe}/\text{CdS}/\text{ZnTe}$ Quantum Well," W. G. Wilke, Ch. Maierhofer, and K. Horn (Fritz-Haber-Institut, West Germany)

2:20 (24) "Measurement of AlAs/InP (100) Heterojunction Band Offset by XPS," J. R. Waldrop, E. A. Kraut, C. W. Farley, and R. W. Grant (Rockwell Int. Sci. Center, Thousand Oaks, CA)

2:25 Discussions

2:35 (25) (Invited) "Device Interface Problems on an Atomic Scale," N. Moll (Hewlett Packard)

3:00 Break

SESSION IV. Heterostructure & Superlattices - Chair: D. E. Aspnes

3:20 (26) "Interface Strain at the Lattice Matched $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}/\text{InP}$ Heterointerface," Mark S. Hybertsen (AT&T Bell Laboratories, Murray Hill, NJ)

3:25 (27) "Transport Properties and Applications of Unstrained $\text{In}_{0.75}\text{Ga}_{0.25}\text{As}-\text{Al}_{0.6}\text{Ga}_{0.4}\text{As}$ Heterojunctions," D. V. Rossi, E. R. Fossum, P. D. Kirchner*, and J. M. Woodall* (Dept. of Elec. Eng., Columbia University, New York, NY, *IBM Research Div., Yorktown Heights, NY)

- 3:30 (28) "Effects of Interface Donors on Far Infrared Photoresponse at Cyclotron Resonance in a GaAs/AlGaAs Heterojunction," R. T. Grimes, J. M. Chamberlain, O. H. Hughes, M. Henini and G. Hill* (Nottingham University, Nottingham, U.K., *Sheffield University, Sheffield, U.K.)
- 3:35 (28x) "Photoexcited Carrier Recombination and Spatial Transport in Surface-Free GaAs Homostructures," L. M. Smith, D. J. Wolford, J. Martinsen, R. Venatasubramanian* and S. K. Ghandhi* (IBM, Yorktown Heights, NY, *Rensselaer Polytechnic Institute, Troy, NY)
- 3:40 Discussions
- 3:50 (29) "Full Zone K·P Theory of Semiconductor Superlattice Electronic Structure," C. Mailhot* and D. L. Smith (*Lawrence Livermore Nat. Lab, Livermore, CA, Los Alamos Nat. Lab., Los Alamos, NM)
- 3:55 (30) "Noncommutative Impurity and Trap Incorporation at Normal and Inverted Interfaces of AlGaAs/GaAs Quantum Wells," R. Kohrbruck, S. Munnix, D. Bimberg, D. E. Mars*, and J. N. Miller* (Technische Universitat Berlin, Germany, *Hewlett Packard Labs, Palo Alto, CA)
- 4:00 (31) "Photoemission Study of the $\text{Ca}_{1-x}\text{Sr}_x\text{F}_2$ / GaAs(100)," Kathleen Stair, J. Zajac, F. Chambers, M. A. Engelhardt* and H. Hochst* (AMOCO Corp. Res. Dept., Naperville, IL, Univ. of Wisconsin, Stoughton, WI)
- 4:05 Discussions
- 4:15 POSTER VIEWING
- 5:30 Dinner (Open) - Be back for evening session at 8:00 p.m.

Wednesday Evening Session

SESSION V. **Tunneling, Electronic Structure and New Techniques - Chair: C. B. Duke**

- 8:00 (32) (Invited) "Transport Across Coherent III-V Heterointerfaces," D. Z. Ting (Caltech)

- 8:30 (33) "Semiconductor Interface Electronic Structure Probing with Ballistic Electrons and Holes," L. D. Bell, M. H. Hecht, F. J. Grunthaner, and William J. Kaiser (CIT, Pasadena, CA)
- 8:35 (34) "Spectromicroscopy: a Novel Tool for Interface Research," W. Ng, A. K. Ray-Chaudhuri, S. Crossley, D. Crossley, C. Gong, J. Guo, R. Hansen, G. Margaritondo, F. Cerrina, J. Underwood*, R. Perera* and J. Kortright (University of Wisconsin, WI. *Center X-Ray Optics, Lawrence Berkeley Laboratory, CA)
- 8:40 (35) "Optically Induced Potential in an STM Junction," R. S. Becker, Y. Kuk, G. Kochanski, H. F. Hess, P. J. Silverman, and R. B. Robinson (AT&T Bell Laboratories, Murray Hill, NJ)
- 8:45 Discussions
- 8:55 (36) "Electronic Structure of a Quasi-One-Dimensional Electron Gas at Finite Temperature," Hong Yu and J. C. Hermanson (Montana State University, Bozeman, MT)
- 9:00 (37) "Strain Relaxation During the Initial Stages of Growth in Ge/Si(001)," A. A. Williams*, J. E. Macdonald*, R. van Silfhout#, J. F. van der Veen#, M. S. Finney**, A. D. Johnson**, and C. Norris** (*Univ. of Wales College Cardiff, UK, #FOM Inst. Atomic Physics, The Netherlands, **Univ. of Leicester, UK)
- 9:05 (38) (Invited) "Structural and Vibrational Properties of Si(111)2x1 from ab-initio Molecular Dynamics," A. Selloni*, F. Ancilotto#, W. Andreoni#, R. Car*, and M. Parrinello*# (*Int. School Adv. Studies, Trieste, Italy, #IBM Zurich Lab, Switzerland)
- 9:20 Discussions
- 9:30 POSTER VIEWING

Thursday Morning Session

SESSION VI. Surface Chemistry: Oxide Growth and Passivation

Chair: Ingolf Lindau

Discussion Leader: Dale Ibbotson

- 8:00 (39) (Invited) "Plasma Enhanced Growth of Semiconductor-insulator Interfaces," G. Lucovsky (North Carolina State)
- 8:30 (40) "A Microscopic Structural Study of the Plasma Enhanced CVD (PECVD) Si-SiO₂ System," B. Robinson (T. J. Watson Res. Ctr., Yorktown Heights, NY)
- 8:35 (41) "Analysis of P₂S₆/NH₄OH Passivated GaAs Surface," Yun Wang and P. H. Holloway (Univ. of Florida, Gainesville, FL)
- 8:40 (42) "Structural and Electronic Properties of As-Stabilized InP (100) Surfaces," G. Hollinger, D. Gallet, M. Gendry, C. Santinelli, and P. Viktorovitch (Lab. d'Elec., ECULLY Cedex France)
- 8:45 (43) "Kinetics of S-GaAs Surface Bonding," K. M. Geib, J. Shin and C. W. Wilmsen (Colorado State University, Ft. Collins, CO)
- 8:50 Discussions
- 9:00 (44) "Electronic Properties of NH₃ Adsorbed on InP(110) Surfaces at Room Temperature," S. Rossi Salmagne, H.-U. Baier, and W. Mönch (Lab. für Festkörperphysik, FRG)
- 9:05 (45) "An *in situ* XPS Study of Interfaces Formed by Remote Plasma Enhanced Chemical Vapor Deposition of Silicon Nitride on Sulfide Passivated InP," W. M. Lau, S. Jin, and X.-W. Wu, S. Ingre^{*} (Nat. Sci. Center, London, Ontario, Canada, ^{*}Bell-Northern Research, Ottawa, Canada)
- 9:10 (46) "Monitoring Low Coverage Surface Chemistry with Bulk Transport: NO₂ Dissociation and Oxygen Penetration at a GaAs(110) Surface," A. vom Felde, C. Bahr, K. Kern^{*}, G. S. Higashi, Y. J. Chabal, M. J. Cardillo (AT&T Bell Laboratories, Murray Hill, NJ, ^{*}IGV-KFA, W. Germany)
- 9:15 (47) "High Quality Molecular Beam Epitaxial Regrowth of (Ga,Al)As On Se-Passivated GaAs (100) Surfaces," F. S. Turco, C. J. Sandroff, D. M. Hwang, T. S. Ravi and M. C. Tamargo (Bellcore, Red Bank, NJ)

9:20 Discussions

9:30 Break

SESSION VIIa. Insulator - Semiconductor Interfaces

Chair: F. J. Grunthaner

9:45 (48) "Studies of GaAs-Oxide Interfaces With and Without Si Interlayer," J. L. Freeouf, S. L. Wright, J. Batey, B. Robinson, T. N. Jackson, and J. M. Woodall (IBM Research, Yorktown Heights, NY)

9:50 (49) "Characterization and Optimization of Ultrathin Si Interface Control Layer for Surface Passivation of InGaAs," H. Hasegawa, M. Akazawa, H. Ishii, A. Uraie, H. Iwadate and E. Ohue (Hokkaido Univ., Sapporo, Japan)

9:55 (50) "Atomic Positions and Relaxation at a Lattice-Mismatched Semiconductor-Insulator Interface: $\text{SrF}_2/\text{Si}(111)$," J. D. Denlinger, M. A. Olmstead, E. Rotenberg, J. R. Patel*, and E. Fontes*, (Univ. of Calif., Berkeley, CA, *AT&T Bell Laboratories, Murray Hill, NJ)

10:00 Discussions

SESSION VIIb. Surface Reconstruction

Chair: Jack Rowe

10:10 (51) (Invited) "The Role of Surface Reconstruction in Interface Morphology," E. D. Williams (University of Maryland, College Park, MD)

10:40 (52) "The Structure of the $\text{ZnSe}(100)c(2 \times 2)$ Surface," H. H. Farrell, M. C. Tamargo, S. Shibli, Y. Chang*, (Bellcore, Newman Springs Rd. NJ, *Univ. of Wisconsin, Madison, WI)

10:45 (53) "Atomic Structure of $p(1 \times 1)$ -Sb Overlayers on the (110) Surface of III-V Compound Semiconductors: A Question of Size?," John P. LaFemina*, C. B. Duke*, and C. Mailhot** (*Pacific Northwest Lab., Richland, WA, **Xerox Webster Ctr., Webster, NY)

10:50 (54) "Surface Dielectric Functions of (2×1) and (1×2) Reconstructions of (001) GaAs," Yia-Chung Chang* and D. E. Aspnes (*Univ. of Illinois, Urbana, IL, Bellcore, Red Bank, NJ)

10:55 (55) "Electronic and Structural Properties of Clusters on III-V Surfaces," M. Menon, J. Gryko, Z-H Huang, and R. E. Allen (Texas A&M Univ. College Station, TX)

11:00 (56) "RHEED Characteristic Abscences in GaAs(100) (2x4)-As: A Tool for Determining the Surface Stoichiometry," C. J. Palmstrom and H. H. Farrell (Bellcore, Red Bank, NJ)

11:05 Discussions

11:15 POSTER VIEWING

Thursday Evening Session

SESSION VIII. Heterostructures, Tunneling and Electron Localization
Chair: Jack Dow

7:30 (57) (Invited) "Theory of Electron Transmission Through Epitaxial Interfaces*," M. D. Stiles (NIST, Gaithersburg, MD, *Work done in collaboration with D. R. Hamann, AT&T Bell Labs)

8:00 (58) "Chemical and Electronic Structure of Pseudomorphic GaAs/InAs/GaAs Quantum Wells and InAs/GaAs Interfaces," F. J. Grunthaner, K. Delgadillo, B. R. Hancock, and J. K. Liu* (CIT, Pasadena, CA, *TRW, Los Angeles, CA)

8:05 (59) "Measurement of the Valence Band Offset in Novel Heterojunction Systems: Si/Ge (100) and AlSb/ZnTe(100)," E. T. Yu, E. T. Croke, D. A. Collins, M. C. Phillips, D. H. Chow, R. H. Miles* and T. C. McGill (T. J. Watson Lab, Pasadena, CA, *Hughes Res. Lab., Malibu, CA)

8:10 (60) "Band Offsets and Electron Localization in Semiconductor Superlattices and Interfaces," J. M. Bass, M. Oloumi and C. C. Matthai (University of Wales, Cardiff, UK)

8:15 Discussions

8:25 (61) "Optical Properties of One-Dimensional Electron Gas Semiconductor Multiple Quantum Wires," J. S. Weiner, G. Danan, A. Pinczuk, J. Valladares, L. N. Pfeiffer, K. West (AT&T Bell Laboratories, Murray Hill, NJ)

- 8:30 (62) "A Proposed Quantum Wire Structure: An 'Accumulation Wire' at Crossing Heterointerfaces," H. Harbury and W. Porod (Univ. of Notre Dame, IN)
- 8:35 (63) "Long-wavelength Infrared Detectors Based on Intersubband Absorption in $\text{Si}_{1-x}\text{Ge}_x/\text{Si}$ Superlattices," Y. Rajakarunanayake and T. C. McGill (CIT, Pasadena, CA)
- 8:40 Discussions
- 8:50 POSTER VIEWING

Friday Morning Session

SESSION IX. Atomic and Electronic Structure - Dynamical Effects
Chair: Phil Cohen

- 8:30 (64) "Surface Dielectric Anisotropies and Phase Diagrams of (001) GaAs," D. E. Aspnes, L. T. Florez, A. A. Studna, and J. P. Harbison (Bellcore, Red Bank, NJ)
- 8:35 (65) "Bismuth and Antimony Adsorption on III-V (110) Substrates: Growth, Order, and Structure," W. K. Ford, T. Guo, L. Chang, S. Lantz, K. Wan, C. B. Duke*, D. L. Lessor# (Montana State Univ., Bozeman, MT, *Xerox Webster Ctr., Rochester, NY, #Pacific Northwest Labs, Richland, WA)
- 8:40 (66) "Substrate Orientation Dependence of Moving Emission and Ordering in $\text{Ga}_{0.51}\text{In}_{0.49}\text{P}$," M. C. DeLong and P. C. Taylor (Univ. of Utah, Salt Lake City, UT)
- 8:45 Discussions
- 9:00 (67) "Subpicosecond Photoelectron Spectroscopy of Laser-Excited Silicon (111) 7x7," Mark W. Rowe, H. Liu, G. P. Williams, Jr., and R. T. Williams (Wake Forest Univ., Winston-Salem, NC)
- 9:05 (68) "Boron $\sqrt{3}\times\sqrt{3}$ Interface Structure on Si(111): Two-Dimensional Ordered Doping Layer," R. L. Headrick, L. C. Feldman, I. K. Robinson, E. Vlieg, A. F. J. Levi, H. S. Luftman and J. Kovalchick (AT&T Bell Laboratories, Murray Hill, NJ)
- 9:10 (69) "Experimental Two-Dimensional Energy Bands for Si(111)-B System," J. E. Rowe, R. L. Headrick and L. C. Feldman (AT&T Bell Labs, Murray Hill, NJ)
- 9:15 Discussions
- 9:25 (70) (Invited) "Structural Probes of Semiconductor Interfaces," J. Golovchenko (Harvard)
- 9:55 Break

SESSION Xa. Fermi Level Pinning - Chair: W. Mönch

- 10:15 (71) (Invited) "Studies of Metal Overlayers on the GaAs(110) Surface by Scanning Tunneling Microscopy and Spectroscopy," R. M. Feenstra (IBM Res. Ctr., Yorktown Heights, NY)
- 10:45 (72) "Electronic Excitation Spectroscopy of the Cs/GaAs(110) Interface," T. Maeda-Wong, N. J. DiNardo*, and E. W. Plummer (Univ. of Penn., PA, *Drexel Univ., PA)
- 10:50 (73) "Morphology, Metalization, and Fermi Level Stabilization," W. E. Spicer, R. Cao, K. Miyano, T. Kendelewicz, and I. Lindau (Stanford Univ., Stanford, CA)
- 10:55 (74) "Schottky Barrier Heights and Interface Chemistry in Ag, In, and Al Overlayers on GaP(110)," M. Alonso, R. Cimino, Ch. Maierhofer, and K. Horn (Fritz-Haber-Institut, West Germany)
- 11:00 Discussions
- 11:15 POSTER VIEWING
- 12:15 Lunch

Friday Afternoon Session

SESSION Xb. Fermi Level Pinning
Chair: Len Brillson

- 1:20 (75) "Metal-GaP(110) Interfaces: The Role of Metallicity and Other Issues," R. Ludeke, M. Prietsch, A. B. McLean and A. Santoni, (IBM Research Ctr., Yorktown Heights, NY)
- 1:25 (76) "Morphological Study of Ag, In, Sb, and Bi Overlayers on GaAs (100)," C. Spindt, R. Cao, K. Miyano, I. Lindau, and W. Spicer (Stanford Elec. Labs, Stanford Univ.)
- 1:30 (77) "Electronic Structure of Alkali Atoms and Aluminum Adsorbed on Semiconductor (110) Surfaces," G. Allan, M. Lannoo and C. Priester (Lab. de Physique de Solides, Lille Cedex, France)
- 1:35 Discussions
- 1:45 (78) "The Role of Ultrathin AlAs Interlayers in Determining the Interface Fermi Energy of the Epitaxial NiAl/AlAs/n-GaAs (001) System," S. A. Chambers, V. A. Loebs, and D. H. Doyle (Boeing Aerospace, Seattle, WA)

- 1:50 (79) "Effect of Discrete Dopants in Schottky Barriers," M. van Schilfgaarde (SRI Int., Menlo Pk, CA)
- 1:55 (80) "Low-Coverage Metal-Induce Unrelaxation of the Semiconductor Surface at Ag/InP(110) Interfaces: A Photoemission EXAFS Study," P. S. Mangat*, K. M. Choudhary*, D. Kilday and G. Margaritondo (*Univ. of Notre Dame, IN, Univ. of Wisconsin, Stoughton, WI)
- 2:00 Discussions
- 2:10 (81) (Invited) "Temperature Dependent Fermi-Level Pinning at Metal-Semiconductor Interfaces," J. Weaver (Univ. of Minnesota)
- 2:40 (82) "Microscopic Origin of the S-Factor for Schottky Barriers," Y. Chang, Y. Hwu, J. Hansen, F. Zanini and G. Margaritondo (Univ. of Wisconsin, Madison, WI)
- 2:45 Discussions
- 3:00 Break

SESSION XI. Interface States, Clusters and Adsorption
Chair: H. H. Wieder

- 3:20 (83) "Interface States, Electronic Barrier, and Chemistry at Metal/MBE-GaAs(100) Junctions: Metal and Orientation Dependence," S. Chang*, L. J. Brillson*, Y. J. Kime#, D. S. Rioux†, P. D. Kirchner** and J. M. Woodall** (*Xerox, Webster, NY, #Syracuse Univ., Syracuse, NY, †Univ. of Wisconsin, WI, **IBM, Yorktown Heights, NY)
- 3:25 (84) "Formation of In/GaP(111) Interface Studied by ELS, XPS and UPS," M. R. Yu, P. Q. Wang, X. F. Jin and X. Wang (Fudan Univ., Shanghai, China)
- 3:30 (85) "Photoemission Study of Li Adsorption on GaAs(110)," C. Laubschat, S. Bröderle, G. Remmers, M. Domke, S. Molodtsov, and G. Kaindl (Inst. für Exper. Berlin, Germany)
- 3:35 Discussions

- 3:50 (86) "Dispersion of Band Gap States Near Metallic Clusters on GaAs(110)," P. N. First, J. A. Stroscio, R. A. Dragoset, D. T. Pierce, and R. J. Celotta (NIST, Gaithersbur, MD)
- 3:55 (87) "XPS Investigation of the Ti/GaAs(100) and the Ti/AlGaAs(100) Interface," R. W. Bernstein and J. K. Grepstad (Univ. of Trondheim, Norway)
- 4:00 (88) "Photovoltaic effects in photoemission studies of Schottky barrier formation," M. H. Hecht (California Institute of Technology, Pasadena, CA)
- 4:05 Discussions
- 4:15 POSTER VIEWING
- 5:45 Conference Banquet - Buses leave from Sheraton Sand Key Hotel

Appendix 3

List of Attendees to PCSI-17

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Appendix 4

Publication of the Proceedings of PCSI-17

Journal of
**Vacuum Science
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Microelectronics
Processing and Phenomena

**Proceedings of the 17th Annual Conference on the
Physics and Chemistry of Semiconductor Interfaces**

An official journal of the American Vacuum Society
Published for the Society by the American Institute of Physics

SUMMARY OF PCSI-17 CONFERENCE

The 17th Annual Conference on the Physics and Chemistry of Semiconductor Interfaces (PCSI-17) was held at the Sheraton Sand Key Hotel, Clearwater, Florida during the three days, January 31, February 1 and 2, 1990, and was attended by 129 people. The Conference format for all contributed papers was a four minute oral presentation and a poster presentation. There were 15 minute discussion sessions after every 4-5 contributed talks. All posters were up for the entire conference giving ample time for poster discussion with the posters being displayed in a large area adjacent to the lecture hall. In addition to the 78 contributed papers, there were ten invited papers representing a cross section of the most active areas in interface physics and chemistry. Most of the 88 papers are included in these proceedings. The topics include: characterization of surfaces and interfaces on an atomic scale; electronic states at heterostructure interfaces; epitaxial metal overlayers; STM: theory, characterization, and novel applications; nucleation of defects in growth including a video-tape of dynamic dislocation climb in epitaxial Si-Ge films; growth and characterization of non-lattice-matched systems; simulation of carrier dynamics of ballistic electron transport; sources of carrier scattering in nonideal interfaces, especially heterojunctions; and novel chemical aspects of activated oxide film growth emphasizing compound semiconductors. As in past years the conference made a contribution to the continuing endowment of the American Vacuum Society for the Annual Peter Mark Memorial Award. Peter was a founder of the PCSI series and a major force in the conference for its first six years until his untimely death. The award is given in honor each year to a young scientist or engineer for outstanding theoretical or experimental work. This year's winner was Dr. Randy Feenstra of IBM T. J. Watson Research Center. He was selected "... for original applications of scanning tunneling microscopy to the study of atomic scale geometric and electronic structure of surfaces." Randy was also one of the invited speakers at PCSI-17.

The overall success of PCSI was due to the efforts of many individuals. In particular, Professor Paul Holloway's secretary, Mrs. Ludie Hampton did an outstanding job with local arrangements. The efforts of our colleagues at the University of Florida and members of the Florida Chapter of the AVS, Lyn Provo, Art Fuente, Tasker Beal, Hugh Starling, Professors Tim Anderson, Robert Park, and Kevin Jones were greatly appreciated. We would like to thank Hugh Starling for running the conference registration and information desk, and Mrs. Grace Pavlisko of AT&T Bell Laboratories who did the typing for the program booklet and helped with mailings from AT&T.

We would also like to acknowledge the generous financial support provided by the Air Force Office for Scientific Research (Horst R. Wittmann) and the Office of Naval Research (Larry R. Cooper). The Conference was held under the sponsorship of the American Physical Society as a topical conference, and the American Vacuum Society's Electronics Materials and Processing Division.

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